

## 10.—NOTES ON THE VEGETATION OF THE NORTH EASTERN GOLDFIELDS.

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### INTRODUCTION.

The ecology of the pastoral region commonly referred to as the North Eastern Goldfields has been discussed by Melville in a paper as yet unpublished. The present paper includes information obtained during two short visits to Glenorn Station, Malcolm (about 120 miles north of Kalgoorlie). The first visit was from 16th April to 9th May and the second was for a fortnight in August. During the first visit fourteen ecological transects—all except one being of the strip type—were surveyed. In this manner representative sample cross-sections of the perennial vegetation were obtained. It is not possible to publish the resultant ecological maps but notes on them and lists of the plants encountered are given herein.

Since the summer rains had been disappointing, there was little growth of summer annuals, including the grasses. A few perennials flowered as a result of rains during February and March, though the falls were light. In August there was a certain amount of herbage available as a result of the June-July rains though these, again, were not heavy.

Owing to the poorness of the seasons and to the shortness of the visits, the remarks made in this paper are not intended to give a complete analysis of the vegetation of the area, but rather, to make available information concerning an area about which very little has been previously published. Reference is made in various parts of the paper to different varieties of *Acacia aneura*. It is proposed to discuss these more fully in a forthcoming paper.

Ecologically speaking the area is in the southern portion of the *Acacia* Semi-desert Scrub as defined by Teakle (1936). *Acacia aneura*, its varieties and allied species, constitute the most important tree and shrub forms. The Malcolm area was surveyed geologically by Clarke (1925). Most of the country studied during the two trips lay in the greenstone areas, all the transects being worked in this type except those across quartz "blows." According to the geological map (Clarke, 1925) the area of spinifex sandplain seen on Glenorn lies over greenstone. Talbot (1920) considered that sandplain development could be correlated with the occurrence of granite. It is possible that the sand in this instance has been transported from granite areas to the north and north-east.

### ECOLOGY.

Melville recognises the following types of country :—(1) Flood Plain, (2) Hills Scrub, (3) Shrub Steppe, (4) Sandplain. With the exception of the third section these hold for the Glenorn area.

#### (1) *Flood Plain.*

"Flooded" country is the local term used in referring to the wide flats across which drains the run off from the low hills. Drainage is of two types.

(a) Occasional well defined, but short, creeks which are shallow and narrow. These soon lose their identity in (b). The course of the creeks can be followed, from some distance away, owing to the bright green foliage of the

creek gums (*Eucalyptus camaldulensis*), which are almost invariably associated with them. Other characteristic plants are jamwood (*Acacia Burkitti*) and creek cassia (*Cassia artemisioides*). The botanical differences between (a) and (b) are quite marked and are probably related to the water supply factor.

(b) Wide flats where the water flows, as a sheet, across the almost level surface. These flats include most of the mulga country that is pastorally valuable, all the better types of mulga (*Acacia aneura*) being found in this habitat. These include the "Silver Leaved" mulga and medium leaved forms. Curra bush (*Acacia genistoides*) is characteristic of this country though, where the creeks merge into the flood plain proper, curra may mingle with jamwood for a short distance. *Eremophila Latrobei*, *E. Margarethae* and *E. maculata* occur in the better watered patches. All are generally referred to as fuelisia bushes though this name is most commonly attached to *E. maculata*. This species, though regarded with suspicion by some as a poison bush, is considered quite useful feed on Glenorm. The first named of the three species is the most widespread. Other shrubs include *Cassia eremophila* and, amongst the smaller forms, *Enchylaena tomentosa*, *Rhagodia* sp. *Abutilon cryptopetalum* and *A. otocarpum*. (See Transects III., IV., XII.)

After the winter rains the flats carry an abundant crop of ephemerals, though at other times the ground between the trees and occasional shrubs is completely bare. The area covered by, and the individual size of, these plants is strikingly related to the amount of water available. By far the best development takes place on the lower levels except where claypan formation, with consequent water-logging of the soil, has prevented any growth whatever. Members of the Compositae, Cruciferae, Chenopodiaceae and Amarantaceae are the most important constituents.

The growth resulting from summer rains includes a number of annual grasses of which *Aristida arenaria*, *Neurachne Mitchelliana* and *Enneapogon caeruleseens* are the most abundant.

The chief soil of the flood plain is a sandy-clay loam (Teakle, 1936) overlying a siliceous hardpan which rests on the country rock. The surface of the hardpan, which is characteristic of the whole pastoral region, is variable so that soil depth may change from a few inches to two or three feet within a few yards.

Throughout the flood plain low ridges of variable extent and importance have developed. Here sand overlies the hardpan to a considerable depth. These are referred to as "Wandarrrie" country and the vegetation differs markedly from that of the lower flats. The mulga remains more or less the same though, so far as could be judged in the time available, it was in a poorer condition. Curra is completely absent and is replaced by bogada bush *Acacia brachystachya*. It may be noted here that this common name is used in the Murchison area to refer to *Acacia linophylla*, while *Acacia brachystachya* is known as sugar brother. *A. linophylla* was not collected at Glenorm. Amongst the smaller shrubs poverty bush (*Eremophila leucophylla*) is, both numerically and pastorally, important as sheep will feed on it when more palatable species disappear during dry seasons. Another species, *E. compacta* also occurs but is not so important on either point. Both these shrubs are capable of standing dormant for long periods. After rain they respond with fresh growth within a short time. Also the conditions favouring germination do not seem to be as exacting as in the case of *Acacia aneura*. In good seasons with satisfactory summer rains the soil carries an abundant growth of Wandarrrie grasses which give the type of country its name. The most important of these are *Eragrostis eriopoda*, *E. setifolia* and *Eriachne Helmsii*. During

dry periods these die back to their woolly rhizomes and become dormant so that the ground is bare between the shrubs. Less important grasses are *Danthonia bipartita*, *Neurachne Mitcheliana*, *Aristida arcuaria* and *Enneapogon caerulescens*. None of these latter grasses is restricted to any particular association but they all prefer the deeper soils. (See Transects II., VIII., XI.)

During the August visit the poverty bushes had formed new growth and there was a number of young seedlings. The bogada had freshened up and some was in flower. The ephemeral growth was very poor compared with that on the loamy flats. The following annuals were collected however:—*Stenopetalum pedicellare*, *S. robustum*, *Parietaria debilis*, *Halorrhagis odontocarpa*, *Velleia rosea*, *V. cynopotamica*, *Podolepis pallida*, *Calotis multicaulis* and *C. hispida*. There was also a fair amount of *Erodium cymnorum*.

If the Wandarrie country be excepted, the flood plain formation may be regarded as lying between the Hills Scrub and the Shrub Steppe.

## (2) Hills Scrub.

On Glenorm the vegetation of the higher ground is closely related to the soil and country rock and may be subdivided as follows:—

(a) On greenstone outcrops and the residual hills from the pre-existing plateau there is a poor *Acacia* scrub (*Acacia Burkittii* var.) which, especially on the higher ground is mixed with *Cassia Sturtii*, *Cassia desolata* and *Brachychiton Gregorii* (kurrajong). The surface consists of boulders of varying size from small pebbles to rounded stones weighing several pounds. The ephemeral growth is poor and most of the species are the same as those on the flats.

(b) Quartz outcrops, i.e. quartz "blows," carry various species of *Cassia*, *C. eremophila* being the most important. *Eremophila scoparia*, *E. Pantoni*, *E. oppositifolia* and *E. Oldfieldii* var. *angustifolia* also occur. These are all tall species 4–7 feet high. Trees are rare, *Acacia aneura* being absent, but there are occasional specimens of myall (*Acacia* sp.) and needle bush (*Hakea ? recurva*). Low shrubs include bluebush (*Kochia sedifolia*), sagobush (*K. pyramidata*) and sage (*Cratystylis conocephala*). (See Transects XII., XIV.)

(c) Ironstone ridges carry a poor growth of mulga and practically nothing else. The mulga trees, though about normal in height, carry a very low proportion of leaves to twigs. Hence there is little "top feed" available for the sheep. Other trees, of which occasional specimens were seen, are kurrajong and sheoak (*Casuarina* sp.). There are few shrubs though poverty bush, bluebush and sagobush were seen. There was practically no ephemeral growth in this country in August.

## (3) Shrub Steppe.

This country is locally known as "lake" country. Providing the rain has been sufficiently heavy the water draining from the higher ridges across the flats ultimately reaches the so-called lakes. A portion of Lake Raeside extends across the south-western corner of the Glenorm property. The lake consists of loamy flats which may, after good rains, hold shallow pools of water from a few inches to a couple of feet in depth. More frequently the water is insufficient to form surface pools. The soil from a dry flat was found to contain 1.33% NaCl. Loose sand, which sparkles with salt crystals, covers the surface in some places and carries a sparse population of samphire. Outside this central area is a zone of very thick samphire (*Arthrocnemum* sp.) 1–2 feet high. All the samphire is valueless from a pastoral point of view. It was not in



flower during either visit and was not studied. On its outer fringe the samphire association merges into the edible shrub association. This outer zone includes low shrubs, up to three and a half feet high, the most important being saltbush (*Atriplex hymenotheca*), sagobush (*Kochia pyramidata*), sage (*Cratystylis conocephala*) and waterbush (*Lycium australe*). Except for waterbush these are all useful fodder plants. Waterbush presents an attractive appearance after rain owing to its abundant succulent leaves. In a dry season however, when they might be of value, these leaves fall, leaving only bare thorny branches. Bluebush (*Kochia sedifolia*) is present in the association but plays a minor role. (See Transects VI. and IX.)

The term "steppe," so far as this Lake Raeside area is concerned is a misnomer, since all the lake zones are broken by low sand ridges bearing small trees. These include needlebush, sheoak, willow (*Pittosporum phillyraeoides*) and one without a common name (*Eremophila miniata*). There is a small amount of a narrow-leaved form of *Acacia aneura*. *Cassia eremophila* and *Acacia brachystachya* also occur.

In overgrazed edible shrub country the saltbush and bluebush appeared to be less capable of regrowth than the sagobush. In time of drought the saltbush seems the least resistant. It is also the most palatable of the shrubs judging by observations. In one place where the vegetative cover had been almost completely lost the plants present were *Bassia divaricata*, annual saltbush (*Atriplex halimoides* and *Atriplex spongiosum*), *Rhagodia* sp. and a relatively large number of plants of *Frankenia fecunda* and *Frankenia setosa*. *Bassia divaricata* and these *Frankenia* spp. were rare in normal edible shrub country. (See Transect VII.)

When seen in August the perennial shrubs were in good condition with plenty of fresh growth and a heavy crop of flowers.

The perennial shrub country is better developed on the north-eastern side of the lake than on the south-western, where low ridges carry wandarrie plants and the flats are normal flood plain. This supports the theory regarding the tendency of these lakes to migrate in a south-westerly direction. Of special interest in regard to this theory was the discovery of an irregular zone of mixed country carrying the plants of the flood plain association interspersed with the edible shrubs. If the lake has migrated, this zone may well represent the intrusion of mulga and curara into the shrub steppe. The peculiar balanced association of the two types cannot be explained by soil character or a difference in water supply. (See Transects V. and X.)

Currant bush (*Scaevola spinescens*) was fairly common in this mixed country. This shrub, though reported as being able to survive heavy stocking (McTaggart, 1936), is not regarded locally as a useful plant.

#### (4) Sandplain.

This type of country is not well developed on Glenorn. There are some small areas of spinifex in the section of the station north of Mount Morgans. There does not seem to be any well defined zone of spinifex. The area seen covered about a square mile, and was surrounded by flood plain and hills scrub formations. The soil of the sandplain is lighter in colour than that of the wandarrie areas. No information was obtained concerning the existence of hardpan in this country.

The spinifex association is very distinct botanically. *Triodia Basedowii* is dominant. No other grass, annual or perennial, was seen. A low shrub form of *Acacia brachystachya*—smaller than the bogada of the wandarrie

country—and an occasional specimen of a myrtaceous plant, which was not found in flower but is probably a species of *Melaleuca*, occur fairly commonly amongst the spinifex plants. The only tree form is an occasional group of mallee of which two species are present. One of these is *Eucalyptus pyriformis*, but the other could not be found in either flower or fruit and was not identified. (See Transect I.)

When seen in August the acacia carried a few flowers, and the spinifex a few seed-heads, though there was practically no new growth. The ephemerals were almost completely absent.

Where the pure spinifex merges into the mulga (flood plain association), the *Acacia* and mallee stop abruptly, but the spinifex mingles with the mulga formation for some distance. The plants of this transition zone, both the mulga and the spinifex, appear to be in better general condition than those in the purer associations.

ECOLOGICAL TRANSECTS.

*Method.*—The first transect was of the line type and ran for 200 yards. The remainder were strips 200 yards long by 24 feet wide, and were worked in squares of 24 feet sides. Soil depth was, in most cases, tested every 24 yards, *i.e.*, every third square. The distance from the surface to the siliceous hardpan was measured by a post hole auger. It was necessary to use water to soften the sunbaked loam so no deep samples could be taken. Surface samples were obtained, however, and these have already been published (Teakle, 1938).

*Transect I.*

On spinifex sandplain north of Mount Morgans. This transect was of the line type. The following plants were encountered in 200 yards :—

<i>Triodia Basedowii</i> (spinifex)	....	....	....	....	163
<i>Acacia brachystachya</i>	....	....	....	....	54
<i>Melaleuca</i> sp.	....	....	....	....	2
<i>Eucalyptus pyriformis</i> (mallee)	....	....	....	....	2

*Transect II.*

The transect ran from a sandy wandarie ridge across the edge of a claypan. The first hundred yards was marked by the number of saltbush plants. The rest of the transect was strongly influenced by the claypan.

	1st 100 yards.	2nd 100 yards.
<i>Acacia aneura</i> (Mulga) :		
Medium-leaved tree	5	1
Short-leaved pine type	0	6
Dead trees	1	17
<i>Atriplex hymenotheca</i> (saltbush)	30	4
Wandarie grass (dormant)	31	6
<i>Eremophila leucophylla</i> (poverty bush)	3	0
<i>Rhagodia</i> sp.	2	1
<i>Kochia sedifolia</i> (bluebush)	0	3
<i>Kochia villosa</i> (glabrous type)	0	1
Dead shrubs	3	30

*Transects III. and IV.*

Transect III. was in line with but in the opposite direction to Transect IV., so that they give a strip 400 yards in length. All but 48 yards of this distance was in typical flood plain country, the mulga and curara bush when considered together averaging about one and a half plants per 64 square yards. The ground was completely bare. According to Melville the mulga association is a closed one.

In the last 48 yards sand covered the loam of the flood plain and there was an abrupt change into wandarrie conditions. The wandarrie grass in the list below refers to the dormant stumps only. It was impossible to tell how many of these were capable of regrowth, so all were counted. This principle was adhered to in all transects.

	1st 352 yds.	last 48 yds.
<i>Acacia aneura</i> :		
Medium-leaved tree ....	38	3
Narrow-leaved tree with pine habit ....	5	0
Broad-leaved inedible shrub ....	1	0
Dead ....	42	1
<i>Acacia genistoides</i> (curara) ....	17	0
<i>Acacia brachystachya</i> (bogada) ....	1	6
<i>Eremophila leucophylla</i> (poverty) ....	4	3
<i>Eremophila longifolia</i> ....	1	0
<i>Eremophila</i> sp. ....	4	0
<i>Abutilon otocarpum</i> ....	2	0
Wandarrie grasses ....	0	113

The following soil depths were recorded :—

III.-IV. 12", 15", 11", 17", 28", 30", 11", 19", 10", 12", 17", 21", 19", 39", 15", 18", 14", 18". (The last three on wandarrie ridge.)

*Transects V. and X.*

These transects were worked parallel to one another and within a hundred yards. The quantity of edible shrubs, mixed with flood plain plants, is in marked contrast to the two previous transects. Wandarrie grass appeared wherever the surface became sandy. Elsewhere the soil was a sunbaked clay-loam.

<i>Acacia aneura</i> :	V.	X.
Medium-leaved tree ....	10	10
Broad-leaved tree ....	1	1
Broad-leaved shrub ....	2	7
Dead ....	20	11
<i>Acacia genistoides</i> ....	5	8
<i>Kochia sedifolia</i> (bluebush) ....	11	15
<i>Kochia pyramidata</i> (sagobush) ....	2	9
<i>Kochia villosa</i> (glabrous type) ....	5	5
<i>Atriplex hymenotheca</i> (saltbush) ....	16	19
<i>Rhagodia</i> sp. ....	16	6
<i>Lycium australe</i> (waterbush) ....	2	9
<i>Scaevola spinescens</i> (currantbush) ....	8	8
<i>Solanum orbiculatum</i> ....	8	0
<i>Cassia eremophila</i> ....	6	4
<i>Eremophila leucophylla</i> (poverty) ....	1	0
Wandarrie grasses ....	123	57
Dead shrubs ....	29	30

The following soil depths were recorded along the two transects :—

V. 13", 8", 8", 18", 21", 25", 27", 15", 20".

X. 9", 9", 12", 14", 11", 12", 11", 11", 12".

#### *Transects VI. and IX.*

Both these were worked in "lake" country and were within half a mile of each other. The transects lines were roughly parallel to the long axis of Lake Raeside so that both dealt with plants of the edible shrub zone only. The area chosen lay to the north of the lake.

	VI.	IX.
<i>Kochia pyramidata</i> (sagobush) ....	3	95
<i>Kochia sedifolia</i> (bluebush) ....	1	4
<i>Atriplex hymenotheca</i> (saltbush) ....	79	97
<i>Rhagodia</i> sp. I. ....	14	15
„ sp. II. ....	29	30
<i>Cratystylis conocephala</i> (sage) ....	69	17
<i>Lycium australe</i> (waterbush) ....	13	88
<i>Eremophila miniata</i> ....	0	3
<i>Acacia aneura</i> ....	0	2

The following soil depths were recorded :—

VI. 28", 28", 31", <52", <52", 22", 14", 17", 18".

IX. 10", 28", 21", 9", 13", 10", 9", 4", 4".

#### *Transect VII.*

This transect area was reported to have formerly carried edible shrubs. Most of the few shrubs left were dead, owing to drought or overstocking or possibly both.

<i>Atriplex hymenotheca</i> ....	1	
<i>Atriplex halimoides</i> ....	6	
<i>Rhagodia</i> sp. ....	27	(all very small)
<i>Bassia divaricata</i> ....	6	
<i>Frankenia fecunda</i> ....	70	
<i>Frankenia setosa</i> ....	12	
<i>Cratystylis conocephala</i> ....	6	
Dead shrubs ....	104	

No soil depth tests were made in this area.

#### *Transects VIII. and XI.*

The wandarrie country was in poor condition, most of the perennials looking shrivelled and browned. Many of the poverty bushes lacked leaves when seen in April but shewed fresh growth in August. It is often difficult to state with certainty which plants are dead and which still capable of recovering. The two transects were mapped within a hundred yards of each other and parallel.



	VIII.	XI.
<i>Acacia aneura</i> :		
Medium leaved tree ....	15	4
Narrow leaved with pine habit ....	7	9
Dead ....	5	5
<i>Acacia brachystachya</i> ....	26	17
<i>Eremophila leucophylla</i> ....	56	63
<i>Cassia eremophila</i> ....	0	4
<i>Rhagodia</i> sp. ....	2	11
<i>Solanum orbiculatum</i> ....	1	0
Wandarrie grass ....	328	380
Dead shrubs ....	10	15

The following soil depths were recorded :—

VIII. 37", 37½", 27", 28", 28", 36", 43", 42", 28".

XI. <52", <52", <52", <52", 39", 50", 18", 15", 26½".

#### Transect XII.

This was mapped in country carrying mulga of a broader leaved form. This type is known locally as Silver Leaved mulga. It retains in the adult leaf the remains of the bladdery hairs found on the young leaves of all varieties. The character is most marked in new growth and on the leaves of trees growing near water.

The presence of a number of poverty bushes—a species which in general prefers sandy situations—was the most interesting feature of the transect.

*Acacia aneura* :

Silver leaved tree ....	47
Medium leaved tree ....	1
Dead ....	12
<i>Acacia genistoides</i> ....	5
<i>Eremophila leucophylla</i> ....	21
<i>Eremophila</i> sp. ....	2
Dead shrubs ....	7

The following soil depths were recorded :—

XII. 26", 17", 7½", 20", 8", 16", 12", 13", 9½".

#### Transect XIII.

The transect line ran down a low slope below a quartz blow. The soil was littered with fragments of quartz. The slope ultimately became a samphire flat. Similar country nearby had formerly carried sage, sagobush and bluebush but it had suffered badly in the bad seasons and practically all the plants were dead. The area selected did not represent the worst, though a very high proportion of the shrubs were dead.

<i>Kochia sedifolia</i> ....	70
<i>Kochia pyramidata</i> ....	17
<i>Cratystylis conocephala</i> ....	4
<i>Frankenia fecunda</i> ....	18
Dead shrubs ....	128
<i>Eremophila scoparia</i> (alive) ....	8
" " (dead) ....	4
<i>Hakea recurva</i> ....	1



Soil depths were tested at distances of 48 yards along the transect. The quartz fragments in the soil of this transect and the following one made the work with the auger difficult. As a result full reliance cannot, unfortunately, be placed in the figures recorded.

XIII. 35", 35", 9", 6", 21".

#### *Transect XIV.*

The area chosen was the side of a stony myall ridge formed by a quartz "blow." On the lower levels the ridge became a loamy flat which carried all the sagobush plants counted during this survey. As in the previous transect the great majority of the shrubs were dead.

<i>Acacia aneura</i> (medium leaved tree) ....	3
<i>Acacia</i> sp. (myall) ....	10
<i>Cassia eremophila</i> ....	4
<i>Kochia sedifolia</i> ....	6
<i>Kochia pyramidata</i> ....	32
Dead shrubs ....	137

The soil depth tests resulted as follows :—

XIV. 13", 9", 9", 9", 35", 12", 7", 10", 12".

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#### REFERENCES.

- Clarke, E. de C., 1925: The Field Geology and Broader Mining Features of the Leonora-Duketon District. *Geol. Surv. West. Aust. Bull* 84.
- McTaggart, A., 1936: A Survey of the Pastures of Australia. *C.S.I.R. (Aust.) Bull.* 99.
- Talbot, H. W. B., 1920: The Geology and Mineral Resources of the North-West, Central and Eastern Divisions. *Geol. Surv. West. Aust. Bull* 83.
- Teakle, L. J. H.:
- 1936: The red and brown hardpan soils of the acacia semi-desert scrub of Western Australia. *Jour. Agric. West. Aust.* Vol. XIII.
- 1938: A Regional Classification of the Soils of Western Australia. *Jour. Roy. Wes. Aust.* Vol. XXII.

<i>Exocarpus aphylla</i> R. Br.	...	...	...	...	Ap.	...	...	C, H
<i>Santalum spicatum</i> (R. Br.) D. C.	Sandalwood	...	...	...	Ap.	Aug.	...	A, B, H
<i>Santalum lanceolatum</i> R. Br.	„	...	...	...	Ap.	Aug.	...	B, D

*Loranthaceae :*

<i>Loranthus gibberulus</i> Tate	...	Mistletoe on <i>Acacia aneura</i>	Ap. Aug.	...	B
<i>Loranthus Murrayi</i> F. v. M. et. Tate	...	Mistletoe on curara	Ap. Aug.	...	B
<i>Loranthus Mitchellianus</i> ...	...	Mistletoe on curara and mulga	Ap. Aug.	...	B
<i>Loranthus pendulus</i> Sieb ...	...	Mistletoe on willow	Ap. Aug.	...	B, G
<i>Loranthus Quandong</i> Lindl.	...	Mistletoe on Silver-leaved mulga	Ap. Aug.	...	B

*Polygonaceae :*

<i>Muehlenbeckia Cunninghamii</i> F. v. M.	Lignum	...	...	Ap. Aug.	...	B
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*Chenopodiaceae :*

<i>Rhagodia</i> spp.	...	...	...	...	...	G, H
<i>Chenopodium Blackianum</i> Aellen.	...	...	...	Aug.	...	B
<i>Chenopodium myriocephalum</i> Aellen	...	...	...	Aug.	...	B
<i>Chenopodium cristatum</i> F. v. M.	...	...	...	Aug.	...	B
<i>Chenopodium melanocarpum</i> Aellen.	...	...	...	Aug.	...	B
<i>Atriplex hymenotheca</i> Moq.	Saltbush	...	...	Aug.	...	G, H
<i>Atriplex semilunaris</i> Aellen.	Annual Saltbush	...	...	Aug.	...	B, G
<i>Atriplex halimoides</i> Lindl.	" "	...	...	Ap. Aug.	...	B, G, H
<i>Atriplex spongiosum</i> F. v. M.	" "	...	...	Ap. Aug.	...	B, G, H
<i>Atriplex nummularia</i> Lindl.	Old Man Saltbush	...	...	Ap. ...	...	G, H
<i>Bassia sclerolaenoides</i> F. v. M.	...	...	...	Aug.	...	B
<i>Bassia paradoxa</i> (R. Br.) F. v. M.	...	...	...	Aug.	...	B
<i>Bassia divaricata</i> (R. Br.) F. v. M.	...	...	...	Ap. Aug.	...	B, G, H
<i>Bassia eriacantha</i> (F. v. M.) Anderson	...	...	...	Aug.	...	B
<i>Bassia uniflora</i> F. v. M.	...	...	...	Ap. Aug.	...	B
<i>Bassia densiflora</i> Fitz.	...	...	...	Aug.	...	B
<i>Kochia Georgei</i> Diels.	...	...	...	Aug.	...	B, C, H
<i>Kochia triptera</i> Benth.	...	...	...	Aug.	...	B, C
<i>Kochia amoena</i> Diels	...	...	...	Aug.	...	B
<i>Kochia-pyramidata</i> Benth.	Sagobush	...	...	Aug.	...	B, E, G, H
<i>Kochia villosa</i> var.	...	...	...	Ap. Aug.	...	B, C, H
<i>Kochia sedifolia</i> F. v. M.	Bluebush	...	...	Ap. Aug.	...	E, G, H
<i>Kochia glomerifolia</i> F. v. M. et. Tate	...	...	...	Aug.	...	E
<i>Kochia carnosa</i> (Moq.) Anderson	...	...	...	Aug.	...	B
<i>Enchylaena tomentosa</i> R. Br.	...	...	...	Ap. Aug.	...	B, C, G, H
<i>Arthrocnemum</i> sp.	Samphire	...	...	...	...	G
<i>Salsola Kali</i> L.	Roly poly	...	...	Aug.	...	B, G

*Amarantaceae :*

<i>Trichinium obovatum</i> Gaud	Cotton bush	...	...	Aug.	...	B, C
<i>Trichinium alopecuroideum</i> Lindl.	...	...	...	Aug.	...	B
<i>Trichinium helipteroides</i> F. v. M.	...	...	...	Aug.	...	B, C
<i>Trichinium corymbosum</i> F. v. M.	...	...	...	Aug.	...	B
<i>Ptilotus villosiflorus</i> F. v. M.	...	...	...	Aug.	...	B
<i>Alternanthera denticulata</i> R. Br.	...	...	...	Ap. Aug.	...	B, C

*Aizoaceae :*

<i>Trianthema crystallina</i> Vahl.	...	...	...	Ap. Aug.	...	B, G
<i>Tetragonia expansa</i> Murr.	Spinach	...	...	Aug.	...	B
<i>Mesembryanthemum australe</i> Soland	Pigface	...	...	Aug.	...	G

*Portulacaceae :*

<i>Calandrinia balonensis</i> Lindl	Parakeelya	...	...	Aug.	...	B, C, G, H
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*Ranunculaceae :*

<i>Ranunculus pentandrus</i> J. M. Black	...	...	...	Aug.	...	B
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## Cruciferae :

<i>Lepidium Drummondii</i> Thell.	...	...	...	Aug.	...	B
<i>Lepidium rotundum</i> (Desv.) D. C.	...	...	...	Aug.	...	B
<i>Lepidium oxytrichum</i> Sprague	...	...	...	Aug.	...	B
<i>Stenopetalum pedicellare</i> Benth.	...	...	...	Aug.	...	B, C
<i>Stenopetalum robustum</i> Endl.	...	...	...	Aug.	...	B, C
<i>Menkea sphacrocarpa</i> F. v. M.	...	...	...	Aug.	...	B
<i>Menkea australis</i> Lehm.	...	...	...	Aug.	...	B, G, H
<i>Menkea villosula</i> J. M. Black	...	...	...	Aug.	...	B
<i>Capsella Andracana</i> F. v. M.	...	...	...	Aug.	...	B

## Crassulaceae :

<i>Crassula colorata</i> Ostf.	...	...	...	Aug.	...	B
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## Pittosporaceae :

<i>Pittosporum phillyraeoides</i> D. C.	Willow	...	...	Ap. Aug.	...	B, G
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## Leguminosae :

<i>Acacia genistoides</i> Benth.	...	Curara	...	Ap. Aug.	...	B, H
<i>Acacia Burkittii</i> Benth.	...	Jamwood	...	Aug.	...	A
<i>Acacia aneura</i> F. v. M.	...	Mulga	...	Ap. Aug.	...	A, B, C, F, G, H
<i>Acacia brachystachya</i>	...	Bogada	...	Aug.	...	G, I
<i>Acacia Burkittii</i> var.	...	...	...	Aug.	...	D
<i>Cassia Chatelainiana</i> Gaud.	...	...	...	Aug.	...	D, E, F
<i>Cassia eremophila</i> A. Cunn.	...	...	...	Aug.	...	B, C, D, H
<i>Cassia artemisioides</i> Gaud.	...	Creek Cassia	...	Aug.	...	A
<i>Cassia Sturtii</i> R. Br.	...	...	...	Aug.	...	D, E
<i>Cassia desolata</i> F. v. M.	...	...	...	Aug.	...	D
<i>Cassia cardiosperma</i> F. v. M.	...	...	...	Aug.	...	D
<i>Brachysema Chambersii</i> Benth.	...	...	...	Aug.	...	I
<i>Daviesia aphylla</i> Benth.	...	...	...	Aug.	...	B, C
<i>Indigofera Georgei</i> Pritzl	...	...	...	Aug.	...	A, B, C
<i>Swainsonia microphylla</i> A. Gray	...	...	...	Aug.	...	B
<i>Swainsonia occidentalis</i> F. v. M.	...	...	...	Aug.	...	B

## Geraniaceae :

<i>Erodium cygnorum</i> Nees.	...	Crowfoot	...	Aug.	...	A, B, C, D
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## Zygophyllaceae :

<i>Zygophyllum iodocarpum</i> F. v. M.	...	...	...	Aug.	...	B, D, H
<i>Zygophyllum fruticosum</i> D. C.	...	...	...	Aug.	...	B, D, H
<i>Tribulus astrocarpus</i> F. v. M.	...	...	...	Aug.	...	B

## Euphorbiaceae :

<i>Euphorbia australis</i> Boiss	...	Hairy Balsam	...	Aug.	...	B
<i>Euphorbia Drummondii</i> Boiss	...	Balsam	...	Aug.	...	B
<i>Euphorbia cremophila</i> A. Cunn.	...	Rock Balsam	...	Aug.	...	D

## Stackhousiaceae :

<i>Stackhousia viminea</i> Sm.	...	...	...	Aug.	...	D
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## Sapindaceae :

<i>Dodonaea lobulata</i> F. v. M.	...	Hopbush	...	Aug.	...	D
<i>Dodonaea filifolia</i> Hook	...	"	...	Aug.	...	D

## Rhamnaceae :

<i>Blackallia connata</i> C. A. Gardn.	...	...	...	Aug.	...	In mulga-spini-fex zone
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## Malvaceae :

<i>Abutilon cryptopetalum</i> F. v. M.	...	...	...	Aug.	...	B
<i>Abutilon otocarpum</i> F. v. M.	...	...	...	Aug.	...	B
<i>Plagianthus Gardneri</i> Bak. M. S.	...	...	...	Aug.	...	B
<i>Sida corrugata</i> var. <i>ovata</i>	...	...	...	Aug.	...	B
<i>Sida calyxhymenia</i> J. Gay.	...	...	...	Aug.	...	B, H
<i>Sida ciliata</i> N. T. Burbidge ms.	...	...	...	Aug.	...	B, H



*Sterculiaceae :*

*Brachychiton Gregorii* F. v. M. ... Kurrajong ... Aug. ... D, F

*Frankeniaceae :*

*Frankenia fecunda* Summerhayes ... Ap. Aug. ... G

*Frankenia setosa* Fitz. ... Ap. Aug. ... G

*Thymelaeaceae :*

*Pinelea microcephala* R. Br. ... Aug. ... B, G, H

*Pimelea thesoids* S. Moore ... Aug. ... B, G, H

*Myrtaceae :*

*Eucalyptus pyriformis* Turcz. ... Mallee ... Aug. ... I

*Eucalyptus* sp. ... " ... " ... I

*Eucalyptus camaldulensis* ... Creek Gum ... Ap. ... A

*Halorrhagaceae :*

*Halorrhagis odontocarpa* F. v. M. ... Aug. ... C

*Myriophyllum rhomboideum* N. T. ... Aug. ... In claypan

Burbidge ms.

*Umbelliferae :*

*Didiscus eriocarpa* Benth. ... Aug. ... B, D

*Daucus brachiatus* Sieb. ... Aug. ... B, D

*Asclepiadaceae :*

*Pentstemonis Kempeana* ... Cogala Creeper ... Ap. ... B

*Labiatae :*

*Teucrium racemosum* R. Br. ... Ap. ... B

*Solanaceae :*

*Solanum orbiculatum* Dun. ... Aug. ... B

*Solanum Oldfieldii* var. *plicatile* Sp. Moore ... Aug. ... E

*Solanum amblynerum* Dun. ... Aug. ... E

*Solanum lasiophyllum* Dun. ... Aug. ... B, C, H

*Nicotiana Gissei* ... Aug. ... D

*Nicotiana Murrayi* F. v. M. et Tate ... Aug. ... D

*Scrophulariaceae :*

*Peplidium Muelleri* Benth. ... Aug. ... B

*Myoporaceae :*

*Eremophila compacta* Sp. Moore ... Poverty bush ... Aug. ... C

*Eremophila leucophylla* Benth. ... " " ... Aug. ... B, C

*Eremophila Murgurethae* Sp. Moore ... Aug. ... B, D

*Eremophila oppositifolia* R. Br. ... Aug. ... D, E, F

*Eremophila metallicorum* Sp. Moore ... Aug. ... B

*Eremophila Latrobei* F. v. M. ... Fuchsia bush ... Aug. ... B

*Eremophila Latrobei* var. *tuberculata* " " ... Aug. ... B

*Eremophila Pantoni* F. v. M. ... Aug. ... D, E

*Eremophila scoparia* F. v. M. ... Aug. ... D, E

*Eremophila Fraseri* F. v. M. ... Fuchsia bush ... Aug. ... E

*Eremophila longifolia* F. v. M. ... Aug. ... B, D

*Eremophila Youngii* F. v. M. ... Aug. ... D, E, F

*Eremophila Oldfieldii* var. *angustifolia* Sp. Moore ... Aug. ... E

*Eremophila maculata* F. v. M. ... Fuchsia bush ... Aug. ... B

*Rubiaceae :*

*Plectronia latifolia* Benth. et Hook ... Aug. ... B

*Goodeniaceae :*

<i>Velleia rosea</i> sp. Moore	...	...	...	...	Aug.	...	C
<i>Velleia cynopotamica</i> F. v. M.	...	...	...	...	Aug.	...	C
<i>Scaevola spinescens</i> R. Br.	...	...	...	...	Aug.	...	H

*Compositae :*

<i>Minuria leptophylla</i> D. C.	...	...	...	...	Aug.	...	B
<i>Calotis multicaulis</i> Druce	...	...	...	...	Aug.	...	C
<i>Calotis hispidula</i> F. v. M.	...	...	...	...	Aug.	...	C
<i>Cratystylis conocephala</i> (F. v. M.)	Sage	...	...	...	Aug.	...	G
Sp. Moore							
<i>Pterigeron cylindriceps</i> J. M. Black	...	...	...	...	Aug.	...	B
<i>Helipterum splendidum</i> Hemsl.	...	...	...	...	Aug.	...	B, C, I
<i>Helipterum Battii</i> F. v. M.	...	...	...	...	Aug.	...	B
<i>Helipterum craspedioides</i> Fitz.	...	...	...	...	Aug.	...	B
<i>Helipterum Charsleyae</i> F. v. M.	...	...	...	...	Aug.	...	B
<i>Helipterum corymbosum</i> Benth.	...	...	...	...	Aug.	...	B
<i>Helichrysum roseum</i> var. <i>Davenportii</i>	...	...	...	...	Aug.	...	B, C
<i>Schoenia cassiniana</i> Steetz.	...	...	...	...	Aug.	...	B
<i>Myriocephalus</i> sp.	...	...	...	...	Aug.	...	B
<i>Myriocephalus Gueriniae</i> F. v. M.	...	...	...	...	Aug.	...	B
<i>Angianthus Drummondii</i> Benth.	...	...	...	...	Aug.	...	B
<i>Calocephalus Francisii</i> Benth.	...	...	...	...	Aug.	...	B
<i>Gnaphalodes uliginosum</i> A. Gray	...	...	...	...	Aug.	...	B
<i>Cephalipterum Drummondii</i> Benth.	...	...	...	...	Aug.	...	B, C
<i>Podolepis pallida</i> Turcz.	...	...	...	...	Aug.	...	B, C
<i>Erodiophyllum acanthocephalum</i> Stapf.	...	...	...	...	Aug.	...	B